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Breaking New Ground: Assisting Farmers with Disabilities Through the Application of Assistive Technology

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Assisting Farmers with Disabilities Through the Application of Assistive Technology

With regards to agriculture in much of Eastern Europe and Northern Africa, the significant problem that landmine detonations present to farmers often goes unnoticed. This problem causes careers in agriculture to be labeled as the most hazardous occupations around the world. However, little attention has been given to rehabilitation practices and assistive technology to help those who have been disabled in this line of work. The Breaking New Ground Resource Center at Purdue University is attempting to resolve the problem at hand by providing technical assistance to those who have been impacted by physical disabilities, in hopes that others may be encouraged to do the same.

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"For hardship does not spring from the soil, nor does trouble sprout from the ground."

–Eliphaz's response to Job

Introduction

Eliphaz was most likely one of Job's more urban friends—certainly not a farm boy experienced with stones and weeds. His observations were also made prior to the invention of landmines and without consideration of the terrible toll that landmines would someday have on those who work the soil for a livelihood. Eliphaz's perspective is not unique to his time but continues to be the norm for many today.

Through the introduction of extensive mechanization and fossil fuel-intensive production methods, less than five percent of the population in most industrialized nations is now directly involved in agricultural production. Most of those reading a publication such as the *Journal of Mine Action* can go days or weeks without encountering an individual who walks the land daily, caring for his or her crops and livestock. In some areas, visiting a working farm and meeting a farmer or rancher has become such a novelty that providing tours for a fee or allowing visitors to pick their own produce as a form of entertainment has become a secondary source of income for some farmers. For many, especially children, in more developed regions, the connection between what they eat and agricultural production practices has become transparent, unimportant and taken for granted. Teenagers living in New York, Brussels, Mexico City or Hong Kong would find it incomprehensible to imagine that half of their peers around the world are participating daily in producing, transporting, and processing food, fiber and forestry products. It would also be nearly impossible for most of them (and their parents) to grasp the impact that landmines have on the lives of millions of farmers, ranchers, livestock herders and others intimately involved with the land.

News accounts are easily passed over and forgotten that include brief mention of how landmines are typically placed in agricultural areas; that four out of five victims of landmines are non-combatants; that landmines have resulted in the loss of significant amounts of once productive land in parts of Egypt, Lebanon, Angola and Afghanistan; and that an estimated 41 percent of landmine survivors in Lebanon were injured while engaging in daily agriculture-related activities. The bias drawing attention away from the significant impact landmines have on agricultural producers is further reflected in the relative intensity of news coverage. For example, if a car bomb explosion takes the lives of eight in a terrorist attack in Tel Aviv, much of the world learns of it on the same day's evening news or the front page of tomorrow's newspaper. However, unintentional landmine detonations that take the lives of hundreds of farmers and shepherds in isolated events scattered over sparsely populated areas go largely unreported and remain an unshared burden. When the only source of food known for many is the local supermarket, the hazards, terror and injuries experienced by a potato farmer in Croatia or a goat herder in Sudan seem irrelevant.

■ A simple metal and canvas sled can be used to easily transport injured animals without having to lift them.

Common Ground

As odd as it may seem to some, there are numerous commonalities between the hazards faced by farmers and agricultural workers in highly mechanized agricultural workplaces and those encountered by farmers involved in more labor-intensive production practices in regions with a high risk of landmine exposure. In the United States, for example, farming has historically been and remains one of the most hazardous occupations with respect to work-related deaths and disabling injuries. Extreme injuries, including amputations resulting from entanglement in agricultural equipment, impact thousands of farm families each year. An estimated 2.7 percent of all treated farm-related injuries are the result of amputations (Stueland, 1990). Corn harvesting activities in Indiana alone resulted in over 100 hand or arm amputations per year for 25 years following the introduction of the mechanical corn picker in the 1940s (Willkomm, 1986). Amputations are also a primary type of injury resulting from landmine detonation. (Cambodia has an estimated 35,000 amputees as a result of landmines). Other commonalities include:

1. Farmers, ranchers, herders and other agricultural workers have historically exhibited a high level of personal risk-taking behavior and a strong affinity to the physical challenges of farming. This group tends to minimize or rationalize the risk of working with hazards that others would generally find unacceptable. They collectively see the rewards of a good harvest and providing for their families as exceeding the risks associated with exposure to hazards, such as aggressive machines, unruly livestock, bad weather, snakes and landmines. Agriculture remains for many a risk-taking occupation that rewards those willing to risk their life and limbs.

2. Agricultural production continues to be a male-dominated undertaking in many regions of the world, especially those most highly mechanized and also those most littered with landmines. Over 95 percent of farmer-related fatalities in North America are male (Purschwitz, 1990), while over 90 percent of landmine victims are reported as male.

3. Injuries associated with both landmine exposure and agricultural production generally occur in rural or isolated locations with minimal access to rapid emergency medical services (Field, 1999). Delays in the discovery of the injured person, administration of appropriate first-aid and transporting him or her to care, and the lack of high-level trauma care result in survivable injuries often becoming life-threatening.

4. Little attention has been given worldwide to rehabilitation practices and assistive technology that would enable a farmer disabled due to injury or disease to return to work. This void certainly impacts farmers in developed, as well as less-developed, regions.

■ As a means of enhancing stability and reducing knee injury, a strap-on milking stool can be easily fabricated.

5. The limited vocational experiences of many farmers, ranchers and herders narrow their window of career opportunities following a disabling injury. Their limitations may be further compounded by their personal desire not to give up the independent lifestyle offered by agriculture or cultural pressures to maintain an agrarian way of life.

6. Even in highly mechanized farm operations, there are a wide range of manual activities that require the use of both hands, eyes and feet. Generally, farm and ranch work is physically taxing and presents significant barriers to individuals with even moderate levels of disability. Attempting to work with a pair of oxen pulling a one-bottom plow with only one hand is equally as frustrating as trying to repair a component on a mechanical harvester using sophisticated tools with only one hand.

7. Farm women, though victims of few landmine incidents or farm-related work injuries, are often exposed to considerable hardships following the disabling injury of their husbands. Women in these situations often become pressed into the position of primary caregiver and generally lack the vocational skills to assume the role the husband

■ When only one hand is available to secure a livestock rope, an open coil secured to a post provides an easy solution.

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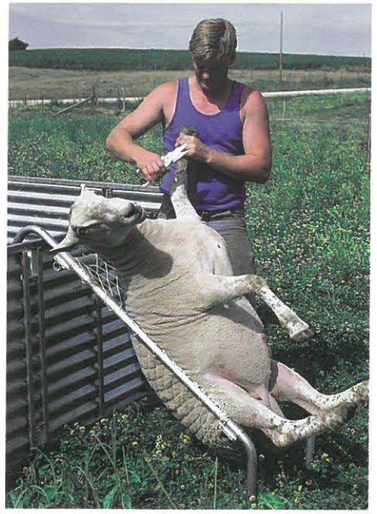


An easily fabricated deck chair for sheep provides a means for safely handling sheep for shearing or medical treatment.

previously held in the farm operation. There are even cultural and religious barriers that hinder such role changes, even when the changes would enhance the financial stability of the family.

Disability, regardless of cause, has a powerful leveling influence between people. The impact of a farmer losing an arm to a grain auger on a Kansas wheat farm can be just as personally devastating as the impact on a mango producer in Nicaragua who loses his arm when he picks up and triggers a land mine washed into his grove due to heavy flooding. Even with all the obvious differences between the two farmers, it appears that their common ground, brought about by disability, could provide a means to build meaningful relationships in order to share ideas and resources that would enhance their potential for regaining a high level of independence and productivity.

Breaking New Ground

Since 1979, the Breaking New Ground Resource Center, located in Purdue University's Department of Agricultural and Biological Engineering, has provided technical assistance to farmers, ranchers and agricultural workers who have been impacted by physical disabilities resulting from injury or disease. Most of this work has focused on the needs of farmers and ranchers involved in highly mechanized operations that require modifications and assistive devices that would enable them to continue operating off-highway equipment such as tractors, combines and other self-propelled farm equipment. Resources designed specifically for farmers have been developed and widely distributed that address specific disability types, such as upper and lower limb amputations, visual and hearing impairments, arthritis and spinal cord injuries. Each resource is intended to provide encouragement and examples of appropriate forms of assistive technology and modified work practices that enable a farmer to complete essential work-related tasks.

One of the Center's most significant undertakings has been the identification, documentation, and cataloging of assistive technology and practices into a single resource that could enhance the independence of farmers and ranchers who desire to return to agricultural-related work following a disability. Hundreds of devices have been identified and described in three editions of Agricultural Tools, Equipment, Machinery, and Buildings for Farmers and Ranchers with Physical Disabilities or as it is now known, The Toolbox. Over 2,600 of these manuals have been placed in rehabilitation facilities, vocational rehabilitation offices and rural county extension offices throughout the United States.

A review of the assistive technologies and practices contained in The Toolbox suggest that there is considerable application of many of the ideas to the rehabilitation process of those disabled due to land mine explosions who require assistance in returning to agricultural-related work. Even the discovery that another farmer on the other side of the globe is still raising sheep or hogs or operating a tractor with a serious disability could be a significant source of encouragement to an individual recently disabled.

Recognizing the barriers caused by language, considerable effort is being made to graphically represent the assistive devices and practices so that they can be eventually shown via the Internet. The intermediate step will be a fully illustrated CD-ROM with high quality photos and drawings, plus a sampling of video clips of adaptive aids in use. This tool will be designed primarily for rehabilitation professionals and will provide adequate descriptions, when appropriate, for local fabrication.

Attempts to seek collaborative support for this work have yet to strike an appropriate chord to raise interest. Responses from several potential donor agencies and organizations suggest that the spirit of Eliphaz is alive and well. The challenge has been to effectively communicate that disabling injuries, from both work-related hazards and unintentional landmine exposure, are a significant problem for farmers worldwide, and that the quality of life for these individuals and their families could be enhanced through the appropriate applications of assistive technology.

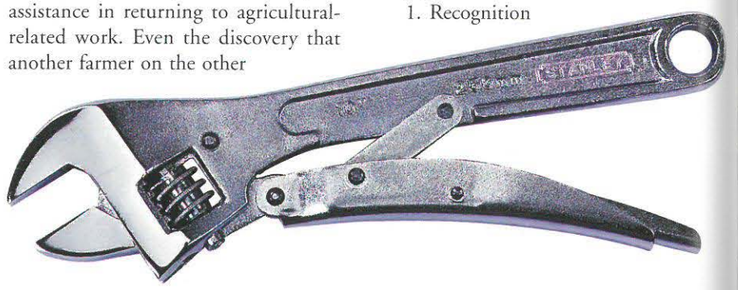
Recommendations

The problem of disability within the agricultural community will not go away. Both a rapidly growing population and increased global tension will ensure a continued role for farmers and their exposure to hazards that will result in disabling conditions. Strategies that might be considered as a means of minimizing the impact of disability on this population include:

1. Recognition that farmers, ranchers, agricultural workers and their families worldwide are being seriously impacted by injury. Little has been published on the personal, family, community and cultural issues related to injury in the agricultural community, especially outside the more industrialized regions of the world.

2. Increased opportunities are needed for professionals working on injury-related issues within agricultural communities to share experiences and resources. This would include events that would address injury prevention, risk assessment, emergency medical services in rural areas and rehabilitation of injured agricultural workers.

3. There is a need for increased access, in appropriate formats, of information that would provide for more rapid rehabilitation of individuals disabled due to injury. This would include resources such as The Toolbox discussed earlier and expanded resources that cover the most basic forms of assistive technology that can be easily fabricated in rural settings.



One-handed adjustable wrenches are commercially available for those with an upper limb amputation.

Conclusions

The hazards associated with agricultural production have always been an intrinsic part of the lives of farmers, ranchers, herders and other agricultural workers. The introduction of land mines during the last century added one more deadly risk with which they must contend. With an estimated 115 million mines still buried in farm fields and orchards in over 60 countries, 10 million new ones being manufactured each year, and the number of new mouths to feed only getting larger, the impact of these hazards will not be easily diminished. Hopefully the demand for food will never become so intense that farmers will be pressed into mine-infested fields, as were the Russian infantry at the Battle of Kursk as a means of protecting Russian tanks.

The fundamental response should be, as with all injury prevention strategies, elimination of the hazard. No farmer, or member of his family, should ever have to enter a field with the terror of knowing that a landmine with the potential to maim or kill is present.

For those farmers who have been disabled and will be disabled, the focus should be on providing appropriate medical care and rehabilitation services. This includes access to assistive technology that will help them regain the highest level of independence possible.

For more information on the resources available through the Breaking New Ground Resource Center visit: www.breakingnewground.info. ■

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**All photos courtesy of the author.*

(Left to Right) Modified hammers are available for those with only one hand and who want to drive nails. A wide range of gardening tools have been adapted for those wishing to garden with limited mobility or hand grip.

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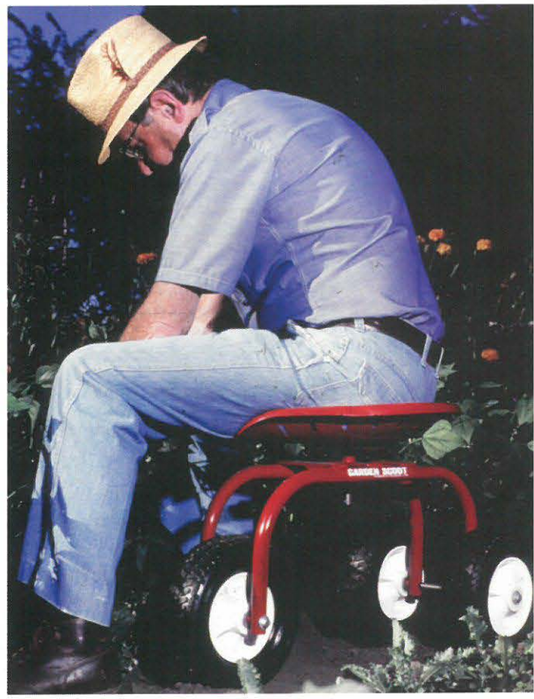

A platform on wheels provides enhanced mobility for those working in vegetable production.